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(54) Electric cable terminal consisting of two independent elements to be assembled by axial sliding.

(57) This terminal is consisting of two elements, one of which is formed by a metal coupling mechanism (1) a first ring (2) connected to the coupling mechanism (1) and a second ring (6) connected to the first ring (2) by means of a narrow lower link (5), so that the second ring (6) is externally projecting beyond the first ring (2), whereas the other element is formed by a hollow, tubular insulating envelope or sleeve internally featuring various subsequent shapes, i.e. a flaring or bellmouth (8) forming an initial step (9), followed by an annular recess (10), a second step (11) almost centrically located with respect to a cylindrical end section (12), so that the terminal to be used by the operator is obtained by introducing the second ring (6) in the sleeve (7) until it is positioned in the annular recess (10) and resting against the first step (9). After connection to the lead by crimping the first ring (2), the sleeve is moved axially so as to uncover the coupling zone, i.e. until the second ring fits into the end portion of the sleeve against the second step (11).

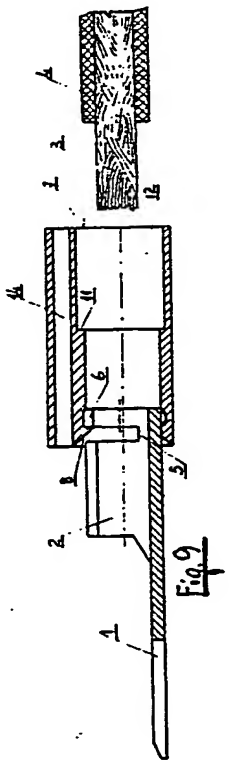

Fig.2

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This patent covers electric cable terminals consisting of two elements, one of which is a metal part to be secured to the cable lead while the other is acting as an insulating sleeve bearing the cable marking elements. These elements are assembled by axial sliding and the sleeve can rotate with respect to the metal element for a better orientation and easy reading of the marking elements.

Terminals which can take on various shapes according to connection requirements are already well known and are including prod, clip-on, ring, spade, and fork type as well as "Faston" (male-female) terminals, etc. These terminals are marked according to various well known marking techniques.

According to currently adopted techniques, one end of the metal components is incorporated by melting into the insulating element of these terminals as described in the French Patents 2477305 and 1468859 and in the European Patent 00345460.

These known solutions have two main drawbacks, i.e. the metal element and insulating sleeve are firmly assembled and won't permit rotation of the sleeve after connection, for a better and easier identification of the cables.

The second drawback is due to the fact that it difficult to secure the metal component to the cable lead by using a special crimping tool. In this case the insulating part of the envelope is also involved in the crimping procedure any may be deformed or even become useless, especially if recessed for introduction of sleeve marker rings. To prevent crimping damage, the insulating part is now manufactured in PVC since this material has excellent flexibility and crushing strength. No other plastic materials can be used for this purpose since they cannot withstand crimping stresses.

According to the Italian Patent n° 12505 A/86, the first drawback was eliminated by rotating the metal component with respect to the insulating sleeve, but the second drawback still remained to be solved.

The European Patent N° 0117166 is also known, according to which the terminal is obtained from flat die-cut shapes which are progressively bent so as to surround the cable lead. However, this approach has also several disadvantages. In the first place, it prevents the sleeve from being rotated in order to ensure easy reading of the markings. Then, there is the fact that this system requires special tools for deformation of the flat links end for application of the envelope and this equipment must be used on the Site where the cables are connected, thus involving discomfort for the operator and loss of time. Furthermore, is seems that this system is only used for prods with the exclusion of all other terminal types.

This Patent has the aim to eliminate all these drawbacks of known terminals and of their manufacturing systems and to make available an implementation system for any kind of terminals which will ensure that the sleeve can be turned with respect to the fixed metal component while ensuring that crimping of the metal element on the lead will absolutely not involve the insulating sleeve. Furthermore, the terminal according to this Patent will simplify its application, since the metal element and sleeve are separately manufactured and are assembled by axial sliding in two subsequent stages, i.e. first to thread the cable and fastening the latter by crimping onto the lead and then a final stage in which the sleeve will cover the connection between the metal component and the lead.

According to this invention, the metal component is fitted with a mechanism for connection to the electrical appliances (prod, fork, ring, Faston etc.); this mechanism being coupled by a first ring-shaped zone which then continues, at the end opposite the connecting mechanism, by a second equally ring-shaped but slightly more open zone, so that it will be peripherally projecting. The insulating element has essentially a hollow tubular shape with two internal annular steps which determine, together with the second ring-shaped zone, the two axial sliding positions. The cable markings are visible on the outside of the insulating sleeve and marking may be performed according to well known systems, for instance by means of ring-shaped marking elements introduced in a transparent recess.

All this leads up to a terminal of new structure and functional design by which the markings can be turned for easy identification and the metal element can be crimped onto the lead without involving the insulating sleeve which will then cover the connection. This solution will also make connection of the cables to the equipment or appliances easier for the operator.

The invention in question is illustrated for exemplification purposes in the enclosed drawing, in which:

Fig. 1, 2 and 3 respectively show a vertical section, top view and horizontal section of the metal component of an exemplified fork-shaped connector;

Fig. 4 and 5 respectively show a view from left and right of the metal component illustrated in Fig. 1;

Fig. 6 shows a vertical longitudinal section of the insulating element fitted, for exemplification purpose, with a system of ring-shaped marking elements;

Fig. 9, 10 and 11 show the progressive assembly stages of the terminal on a cable;

Fig. 12 shows a view from the right of the therminal illustrated in Fig. 11;

Fig. 13 and 14 show terminals with other marking systems;

Fig. 15, 16 and 17 show a top view of the metal component of the terminal with different connecting devices.

With reference to these Figures, the mechanism 1 is coupled to an electrical equipment or appliance, for instance a fork. This mechanism is first connected to the zone 2 forming a closed ring having a diameter in consistency with the diameter of the lead 3 of cable 4 and long enough to permit crimping as described hereinafter.

This initial zone 2 is connected by a narrow lower link 5 to a second zone 6 of limited width forming a slightly open ring, so that this second ring 6 is slightly projecting with respect to the first ring 2.

The insulating element 7 has a hollow tubular shape and is internally featuring from left to right, i.e. starting from the connecting mechanism, a flaring 8, forming a first step 9, a slight annular recess 10 having the same width as the second ring 6, a second step 11 and an end section 12 having about the same diameter as the annular zone 6. The cable marking will appear on one side of this sleeve, as exemplified in the Figures 6, 7 and 8 by means of ring shaped marking elements 13, introduced in a transparent longitudinal recess 14.

After having thus defined the metal and insulating ccomponents, the two parts are assembled as shown in Fig. 9, by fitting the second annular zone 6 into the first section of the sleeve 7, initially causing a deformation of the bellmouth 8 and the first step 9, until this second ring shaped zone snaps into the annular recess 10 where it remains locked through the action of the first step 9.

In these conditions, the operator will have access to the terminal and can fit it on the cable featuring the bare lead 3. The operator will then thread this lead into the first ring 2 of the terminal and will use special pinchers for deformation of the ring 2 into 2' thus securing the cable to the terminal as shown in Fig. 10. This operation is easily completed and will not affect the insulating envelope according to the objectives of these Letters Patent.

Subsequently, the operator will push the sleeve 7 towards the connecting mechanism 1 until the sleeve 7 covers the terminal/conductor coupling zone, as shown in Fig. 11. By the latter operation, the second annular zone 6 fits into the end section 12 resting against the second step 11 of the sleeve 7.

The figures 11 and 12 clearly show that the metal component and the insulating element always remain reciprocally independent although there may be a slight friction between the two elements. This means that the sleeve 7 can freely rotate in the direction of the arrows F shown in Fig. 12, so that the identification code can be located in the best position for easy reading, according to the objective of this Patent.

As explained before, the insulating sleeve 7 may provide for cable marking in various modes. Mention has already been made of ring shaped marking elements 13, fitted into a longitudinal recess 14, but the markings 15 may also be directly printed or stamped on the sleeve as shown in Fig. 13, or code labels 17 may be introduced in the slot 16 as shown in Fig, 14. Any marking system may be used for the terminal subject matter of this Patent.

The device to be connected to the electric equipment or appliance may also be of any design.

For instance, the Figures 1 through 12 are featuring a fork or "spade" type connector 1 for exemplification purposes, but this mechanism may also be ring-shaped 18 as shown in Fig. 15, or a prod 19, as shown in Fig. 16, or a male or female faston 20, as shown in Fig. 17, or a hook, etc.

Obviously, the first and second annular shaped zones may be replaced by complete rings without notches, although the second ring 6 shall always have a slightly larger diameter than the first ring 2.

Claims

1. Electric cable terminal featuring a metal component to be connected to the cable lead and an insulating sleeve-like envelope **characterized** by the fact that this terminal is consisting of two independent components to be assembled by axial sliding and in particular:

a) one metal element including a mechanism (1, 18, 19, 20) to be coupled to the equipment or appliance to be connected, a first zone forming a closed ring (2) connected to the coupling device and a second annular shaped zone (6) connected to the first annular zone (2) by means of a narrow lower link (5), the second annular-shaped zone being slightly open so as to project beyond the first ring (2);

b) one insulating hollow tubular shaped envelope or sleeve (7), internally featuring various shapings, i.e. a flaring (8) generating a first step (9), a slight annular recess (10) having the same width as the second ring (6), a second almost central annular step (11) and an end section (12) having the same diameter as the second ring (6), so that the two elements are assembled by slipping the second ring (6) into the first section of the sleeve or envelope (7) causing an initial deformation of the flaring (8) until the second ring snugly fits into the

annular recess (10) resting against the first step (9), the two assembled elements thus being ready for use by the ooerator.

2. Terminal as described in claim n° 1, **characterized** by the fact that the annular zone (2) receiving the lead (3) of the cable (4) is located outside the insulating envelope or sleeve (7) so that crimping, that is deformation of the ring (2′) for fastening of the lead (3) is very simple while these operations will not effect the insulating sleeve (7).

3. Terminal as described in claim n° 1, **characterized** by the fact that the zone linking the first ring after deformation (2′) to the lead (3) is protected by the insulating sleeve (7) by axial sliding until the second ring (6) fits into the end section (12) of the sleeve (6) resting against the second step (11).

4. Terminal as described in claim n° 1, **characterized** by the fact that the coupling mechanism may be of any type, such as fork or spade shaped (1), ring (18) or prod (19) shaped or "Faston" (20) male and female type.

5. Terminal as described in claim n° 1, **characterized** by the fact that the sleeve (7) is designed for cable marking according to any known system, whatsoever, such as for instance ring-shaped marking elements (13) housed in a longitudinal recess (14) or printed (15) or labelled codes (17) housed in slots (16) prepared in the sleeve or envelope.

6. Terminal as described in claim n° 1, **characterized** by the fact that the first and second ring (2, 6), are either more or less open annular shapes or are completely closed, the second ring (6) having a slightly larger diameter than the first ring (2).

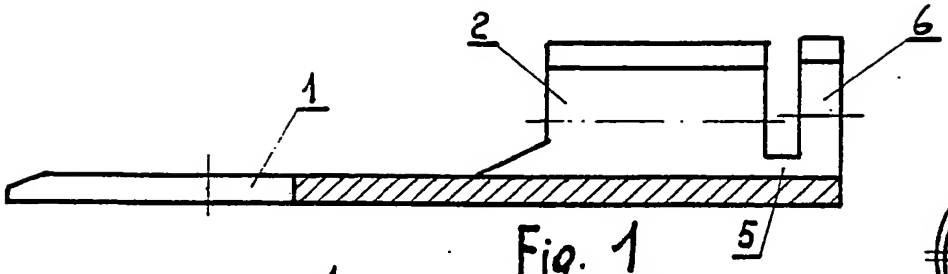

Fig. 1

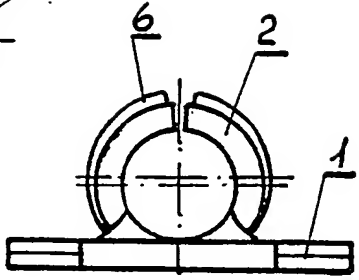

Fig. 4

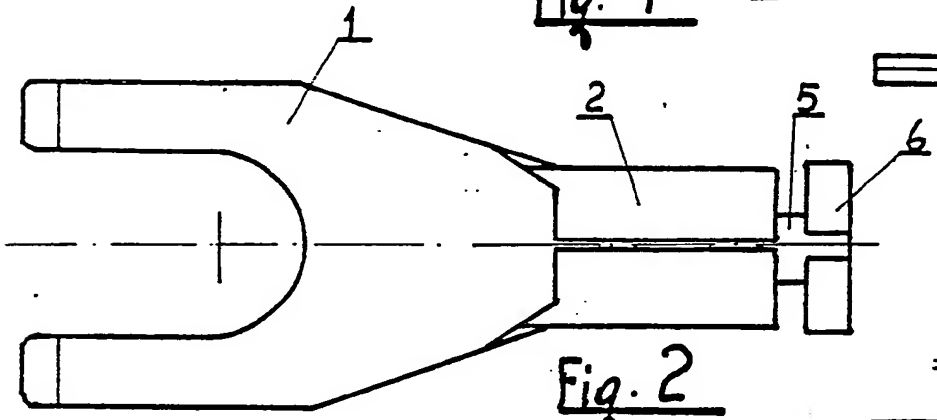

Fig. 2

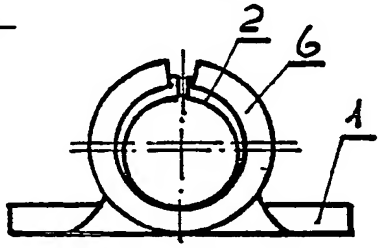

Fig. 5

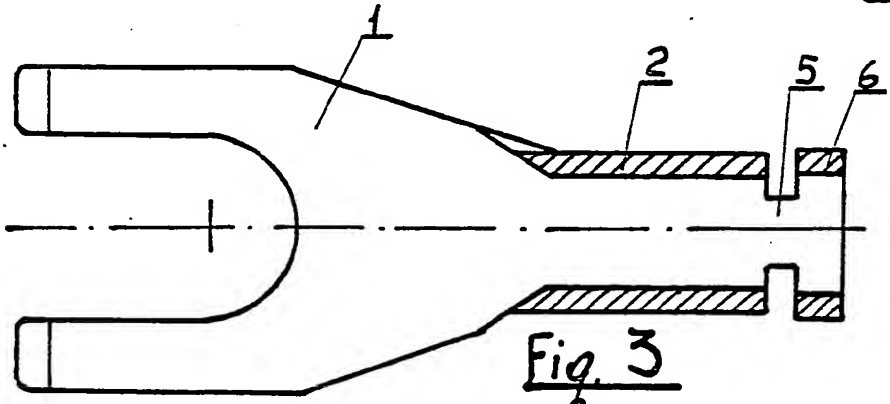

Fig. 3

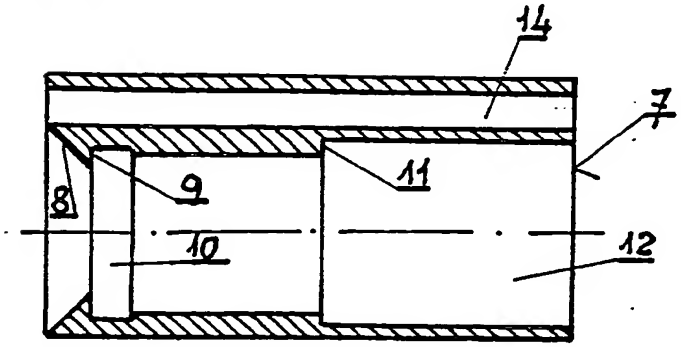

Fig. 6

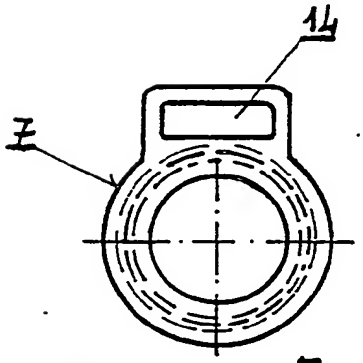

Fig. 7

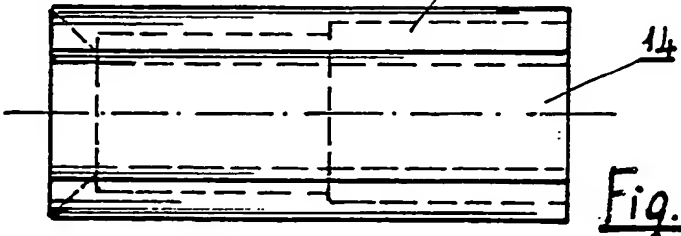

Fig. 8

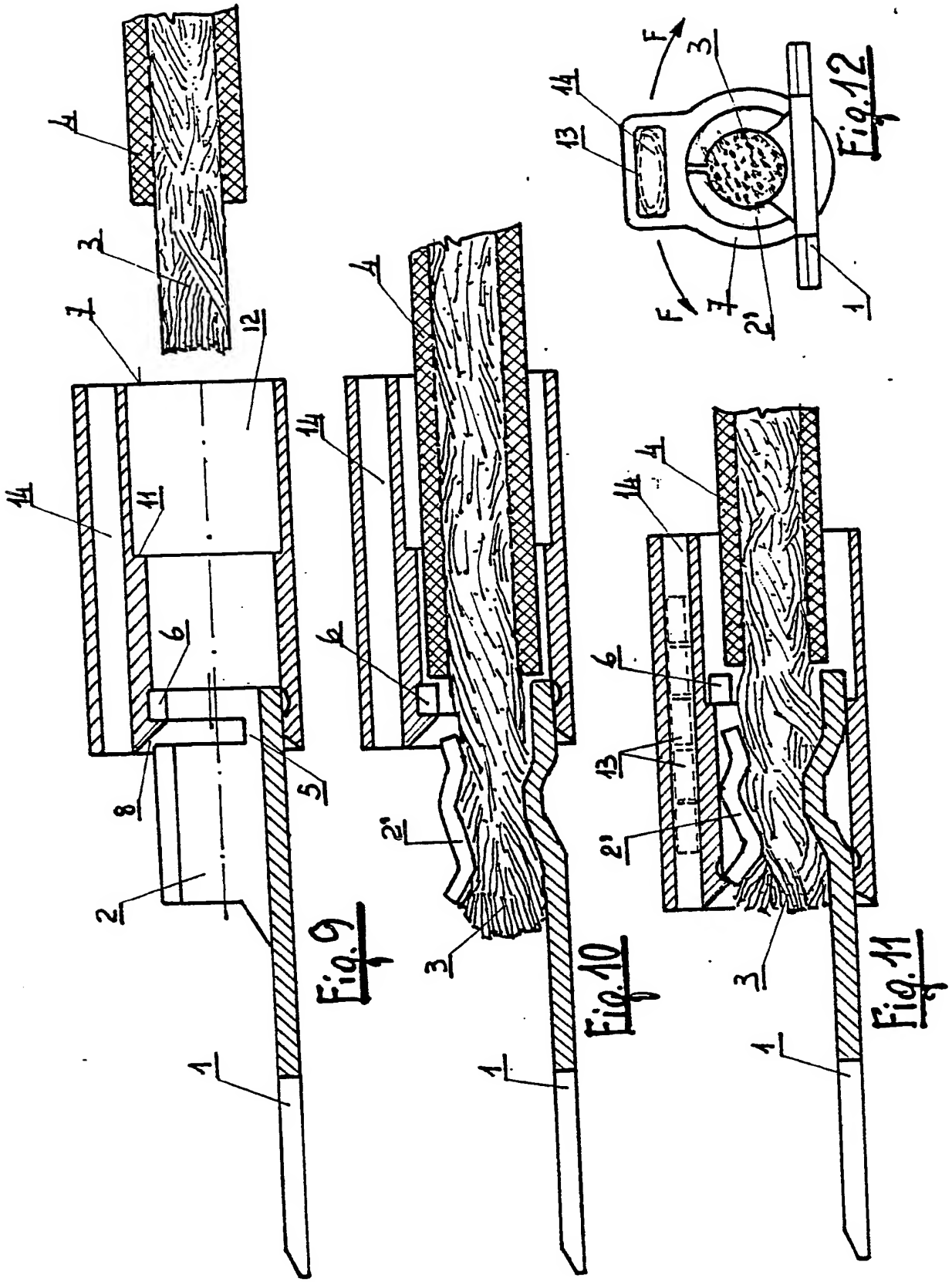
4
3
7
12
14
11
6
8
5
2
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Fig.9
4
14
6
2'
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1
Fig.10
4
14
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13
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Fig.11
F
3
14
13
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F
Fig.12

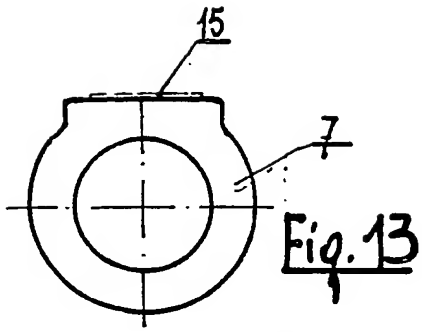

Fig.13

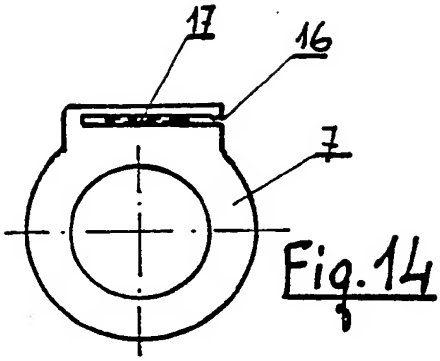

Fig.14

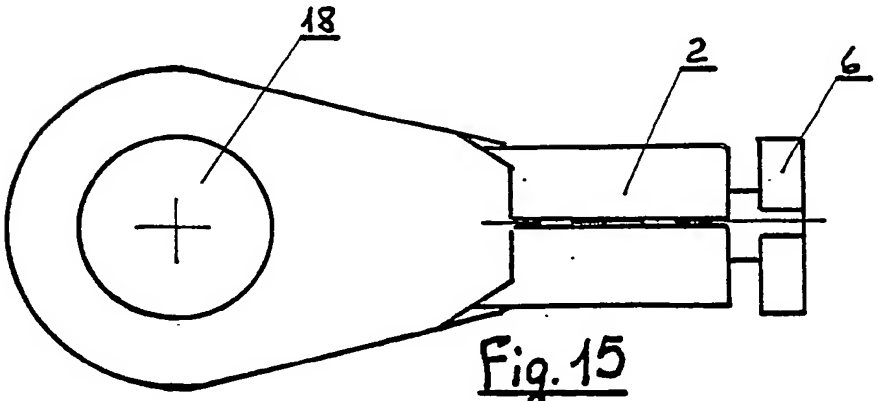

Fig.15

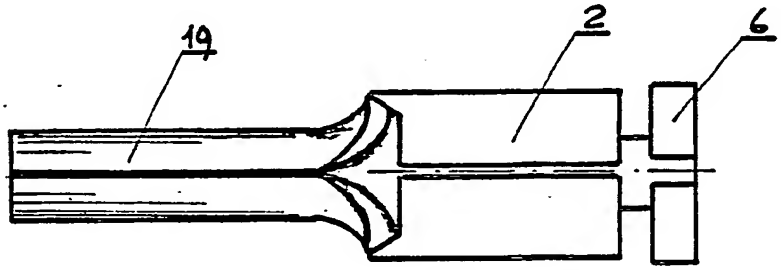

Fig.16

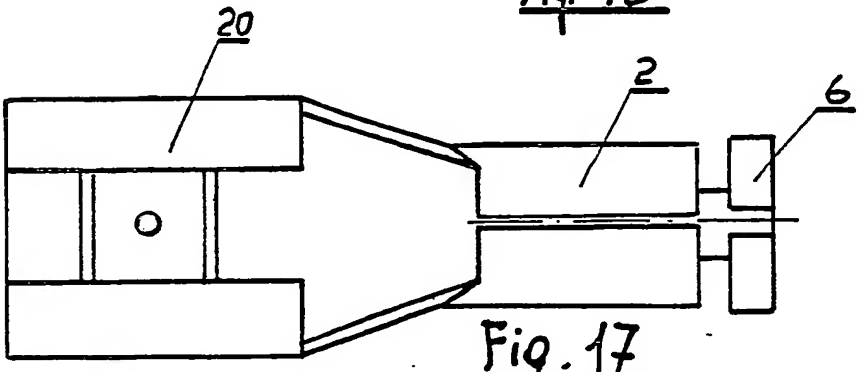

Fig.17

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 88 10 9069

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	US-A-4 214 361 (D.R. COLDREN et al.)		H 01 R 43/20
A	US-A-4 557 048 (A.V. CORDEIRO)		
A	US-A-4 658 503 (H.L. EATON)		

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

H 01 R 43/00

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	21-07-1988	BERTIN M.H.J.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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